

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listing of claims previously presented in this application:

Claim 1 (Currently amended): A cooling system for use with a microwave antenna, comprising:

a cooling jacket adapted to at least partially surround a microwave antenna,
wherein the cooling jacket is further adapted to retain a cooling fluid therein such that at least a portion of the microwave antenna is in fluid contact with the cooling fluid and wherein the microwave antenna comprises a distal tip configured to penetrate tissue.

Claim 2 (Original): The system of claim 1 further comprising at least one inlet lumen and at least one outlet lumen each in fluid communication with the cooling jacket for circulating the cooling fluid therethrough.

Claim 3 (Original): The system of claim 2 wherein a distal end of the inlet lumen is positioned near or at a distal end of the microwave antenna.

Claim 4 (Original): The system of claim 2 wherein a distal end of the outlet lumen is positioned proximally of the microwave antenna distal end.

Claim 5 (Original): The system of claim 2 wherein the inlet lumen is defined along an outer surface of the cooling jacket.

Claim 6 (Original): The system of claim 2 wherein the inlet lumen is defined within a wall of the cooling jacket.

Claim 7 (Original): The system of claim 1 further comprising a tip at a distal end of the cooling jacket.

Claim 8 (Original): The system of claim 7 wherein the tip is tapered.

Claim 9 (Original): The system of claim 7 further comprising a power generator in electrical communication with the tip.

Claim 10 (Original): The system of claim 7 wherein a distal end of the microwave antenna is securable to a proximal portion of the tip.

Claim 11 (Original): The system of claim 10 wherein the tip is adapted to be in electrical communication with the distal end of the microwave antenna.

Claim 12 (Original): The system of claim 1 further comprising a handle assembly for attachment to a proximal end of the cooling jacket.

Claim 13 (Original): The system of claim 12 wherein the handle assembly defines at least one lumen therethrough which is in fluid communication with the cooling jacket.

Claim 14 (Original): The system of claim 1 further comprising a pump for circulating the cooling fluid through the cooling jacket.

Claim 15 (Original): The system of claim 1 wherein the cooling fluid comprises a liquid, gas, or combination thereof.

Claim 16 (Original): The system of claim 15 wherein the liquid comprises water or saline.

Claim 17 (Original): The system of claim 15 wherein the gas is selected from the group consisting of nitrous oxide, nitrogen, and carbon dioxide.

Claim 18 (Original): The system of claim 1 further comprising a temperature sensor for sensing a temperature of the system.

Claim 19 (Original): The system of claim 1 further comprising an introducer which is insertable into the cooling jacket.

Claim 20 (Original): The system of claim 1 wherein the cooling jacket is configured in length to match a radiating portion of the microwave antenna.

Claim 21 (Original): The system of claim 1 wherein the cooling jacket defines at least a first and a second region adjacent to and separate from one another, the first region being adapted to retain the cooling fluid from a first source in fluid contact with a first portion of the microwave antenna, and the second region being adapted to retain cooling fluid from a second source in fluid contact with a second portion of the microwave antenna.

Claim 22 (Original): The system of claim 21 wherein the cooling fluid from the first source is maintained at a first temperature and the cooling fluid from the second source is maintained at a second temperature.

Claim 23 (Original): The system of claim 21 wherein the cooling jacket defines a plurality of additional regions adjacent to and separate from one another.

Claim 24 (Original): The system of claim 1 wherein the cooling jacket defines at least a first and a second region adjacent to and separate from one another, the first region being adapted to retain the cooling fluid from a first source in fluid contact with a first portion of the microwave antenna, and the second region being adapted to retain cooling fluid from the first source in fluid contact with a second portion of the microwave antenna.

Claim 25 (Withdrawn): A method of cooling a microwave antenna, comprising:

providing a cooling jacket adapted to surround a microwave antenna at least partially along a length of the microwave antenna; and

flowing a cooling fluid through the cooling jacket such that the fluid is retained within the cooling jacket and directly contacts at least a portion of the microwave antenna.

Claim 26 (Withdrawn): The method of claim 25 further comprising advancing the cooling jacket with the microwave antenna into a tissue region to be treated prior to flowing the cooling fluid through the cooling jacket.

Claim 27 (Withdrawn): The method of claim 25 further comprising flowing the cooling fluid through the cooling jacket prior to advancing the cooling jacket with the microwave antenna into a tissue region to be treated.

Claim 28 (Withdrawn): The method of claim 25 further comprising flowing the cooling fluid through the cooling jacket while advancing the cooling jacket with the microwave antenna into a tissue region to be treated.

Claim 29 (Withdrawn): The method of claim 26 wherein advancing the cooling jacket comprises energizing a tip positioned at a distal end of the cooling jacket to cut through tissue.

Claim 30 (Withdrawn): The method of claim 25 further comprising energizing the microwave antenna prior to flowing the cooling fluid through the cooling jacket.

Claim 31 (Withdrawn): The method of claim 25 further comprising energizing the microwave antenna while flowing the cooling fluid through the cooling jacket.

Claim 32 (Withdrawn): The method of claim 25 wherein flowing the cooling fluid comprises pumping the cooling fluid through the cooling jacket.

Claim 33 (Withdrawn): The method of claim 25 wherein flowing the cooling fluid comprises passing the fluid through an inlet lumen into the cooling jacket.

Claim 34 (Withdrawn): The method of claim 33 wherein passing the fluid through the inlet lumen comprises passing the fluid through the inlet lumen defined along an outer surface of the cooling jacket.

Claim 35 (Withdrawn): The method of claim 33 wherein passing the fluid through the inlet lumen comprises passing the fluid through the inlet lumen defined within a wall of the cooling jacket.

Claim 36 (Withdrawn): The method of claim 33 further comprising passing the fluid through an outlet lumen out of the cooling jacket.

Claim 37 (Withdrawn): The method of claim 25 wherein the fluid is statically retained within the cooling jacket.

Claim 38 (Withdrawn): The method of claim 25 wherein flowing the cooling fluid comprises flowing the fluid at a uniform flow rate.

Claim 39 (Withdrawn): The method of claim 25 wherein flowing the cooling fluid comprises flowing the fluid at an intermittent flow rate.

Claim 40 (Withdrawn): The method of claim 25 wherein the fluid directly contacts a radiating portion of the microwave antenna.

Claim 41 (Withdrawn): The method of claim 25 wherein the fluid directly contacts a shaft portion of the microwave antenna.

Claim 42 (Withdrawn): The method of claim 25 further comprising sensing a temperature of the microwave antenna.

Claim 43 (Withdrawn): The method of claim 42 further comprising initiating an alarm upon the temperature reaching a predetermined level.

Claim 44 (Withdrawn): The method of claim 25 further comprising flowing the cooling fluid through a second portion of the cooling jacket such that the fluid is retained within the second portion and directly contacts at least a second portion of the microwave antenna.

Claim 45 (Withdrawn): The method of claim 25 further comprising removing the microwave antenna from a tissue region.

Claim 46 (Currently amended): A cooling sheath system for use with a microwave antenna, comprising:

a first tubular member defining an antenna lumen therethrough, the first tubular member being adapted to at least partially surround the microwave antenna;

a second tubular member positioned about a length of the first tubular member; and

a fluid channel defined between the first tubular member and the second tubular member,

wherein the fluid channel is adapted to retain a cooling fluid therein and envelope at least a portion of the antenna lumen and wherein the microwave antenna comprises a distal tip configured to penetrate tissue.

Claim 47 (Original): The system of claim 46 further comprising at least one inlet lumen in fluid communication with the fluid channel.

Claim 48 (Original): The system of claim 47 wherein a distal end of the inlet lumen is positioned near or at a distal end of the fluid channel.

Claim 49 (Original): The system of claim 47 further comprising at least one outlet lumen in fluid communication with the fluid channel.

Claim 50 (Original): The system of claim 49 wherein a distal end of the outlet lumen is positioned near or at a proximal end of the fluid channel.

Claim 51 (Original): The system of claim 46 wherein the second tubular member is coaxially positioned about the length of the first tubular member.

Claim 52 (Original): The system of claim 46 wherein a distal end of the first tubular member and a distal end of the second tubular member are attached together.

Claim 53 (Original): The system of claim 46 wherein a proximal end of the second tubular member is attached along an outer surface of the first tubular member.

Claim 54 (Original): The system of claim 46 wherein the antenna lumen is adapted to conform to a shape of the microwave antenna.

Claim 55 (Original): The system of claim 46 wherein the fluid channel is concentrically defined between the first tubular member and the second tubular member.

Claim 56 (Original): The system of claim 46 further comprising a pump in fluid communication with the fluid channel.

Claim 57 (Original): The system of claim 46 wherein the first tubular member and the second tubular member are integrally fabricated together.

Claim 58 (Original): The system of claim 46 wherein the first tubular member and the second tubular member are comprised of a metallic material.

Claim 59 (Original): The system of claim 46 wherein the first tubular member and the second tubular member are comprised of a polymeric material.

Claim 60 (Original): The system of claim 46 wherein the first tubular member and the second tubular member are comprised of a ceramic material.

Claim 61 (Original): The system of claim 46 further comprising a hub connected to a proximal portion of the system.

Claim 62 (Original): The system of claim 61 further comprising an adjustable securing member positioned on the hub which is adapted to inhibit movement of at least the first tubular member relative to the microwave antenna.

Claim 63 (Original): The system of claim 46 wherein the antenna lumen is adapted to surround a shaft portion of the microwave antenna.

Claim 64 (Withdrawn): A method of cooling a microwave antenna, comprising:
providing a cooling sheath adapted to surround a microwave antenna at least partially along a length of the microwave antenna; and

flowing a cooling fluid through the cooling sheath such that the fluid is retained within a fluid channel defined between an outer jacket and an antenna lumen positioned within the outer jacket, wherein the fluid channel envelopes at least a portion of the length of the antenna lumen.

Claim 65 (Withdrawn): The method of claim 64 further comprising advancing the cooling sheath with the microwave antenna into a tissue region to be treated prior to flowing the cooling fluid.

Claim 66 (Withdrawn): The method of claim 64 further comprising energizing the microwave antenna prior to flowing the cooling fluid through the cooling sheath.

Claim 67 (Withdrawn): The method of claim 64 further comprising energizing the microwave antenna while flowing the cooling fluid through the cooling sheath.

Claim 68 (Withdrawn): The method of claim 64 wherein the fluid is retained within a concentrically-defined fluid channel.

Claim 69 (Withdrawn): The method of claim 64 wherein flowing the cooling fluid comprises pumping the cooling fluid through the cooling sheath.

Claim 70 (Withdrawn): The method of claim 64 wherein flowing the cooling fluid comprises passing the fluid through an inlet lumen into the cooling sheath.

Claim 71 (Withdrawn): The method of claim 70 further comprising passing the fluid through an outlet lumen out of the cooling sheath.

Claim 72 (Withdrawn): The method of claim 64 wherein the fluid is statically retained within the cooling sheath.

Claim 73 (Withdrawn): The method of claim 64 wherein flowing the cooling fluid comprises flowing the fluid at a uniform flow rate.

Claim 74 (Withdrawn): The method of claim 64 wherein flowing the cooling fluid comprises flowing the fluid at an intermittent flow rate.

Claim 75 (Withdrawn): The method of claim 64 further comprising conforming the cooling sheath to an outer surface of the microwave antenna prior to flowing the cooling fluid.

Claim 76 (Withdrawn): The method of claim 64 further comprising securing the cooling sheath to the microwave antenna to inhibit movement of the cooling sheath relative to the microwave antenna prior to flowing the cooling fluid.

Claim 77 (Withdrawn): The method of claim 64 further comprising removing the microwave antenna from a tissue region.

Claim 78 (New): The system of claim 46 wherein the first tubular member is comprised of metal and the second tubular member is comprised of a polymeric material.